Occurrence Probability of Pc1 Micro Pulsations Observed at Barrow During the Solar Quiet Period

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Observation of short-period magnetic pulsations at the CMDL Barrow Observatory (BRW) continued uninterrupted since 1995 using an induction magnetometer with a digital data logger. All the acquired daily data produced at a 5.2-mb rate at Barrow has been compiled into an archive of the Solar-Terrestrial Energy Program (STEP) Polar Network. Quick-look plots of Fourier dynamic spectra including 9 days on a page have been produced and are publicly accessible at http://hpep3.eps.s.u-tokyo.ac.jp. We show in the data set synoptic characteristics of Pc1-type magnetic pulsations deduced from features of the dynamic spectra during the solar quiet period of 1995-1997.

Pc1-type spectra were searched on every spectral chart, and their occurrence was examined in bins of 0.1-0.5 Hz, 0.5-1.0 Hz and above 1.0 Hz for every 2 hours of universal time (UT). Table 1 shows occurrence probabilities of Pc1 pulsations involved in the bins of the three frequency bands for every 2 hours. Statistics were developed on four ensembles: the whole period, the equinox seasons, the summer seasons, and the winter seasons. Occurrence probability in the low-frequency band is found to be high around local Barrow noon (UT − 12 hours, approximately) to afternoon and is highest in the summer season. Small enhancements of Pc1 occurrence in high and middle frequency bands are found from midnight to early morning both in winter and equinox seasons, but are suppressed in summer seasons. Taking into account the geomagnetic latitude (69.9°) of Barrow and past reports of similar observations, the above results can be considered reasonable. It will be interesting to see how the previously noted tendencies will be modified by the recent solar active period. These effects will be determined as the final data become available. These results will also be derived from simultaneous data from identical instruments operated at more than 20 locations at various latitudes. Toward this end, a special algorithm to pick up Pc1 events automatically is being developed because such an algorithm is essential to the efficient processing of such a large amount of data and to produce frequency statistics efficiently.

TABLE 1. Time Dependency of Occurrence Probabilities of Pc1 Micro Pulsations During the Solar Quiet Period, 1995-1997, Observed at Barrow, Alaska.

Time	Occurrence Probability					
(UT)	0.1-0.5 Hz	0.5-1.0 Hz	1.0-2.0 Hz	0.1-0.5 Hz	0.5-1.0 Hz	1.0-2.0 Hz
	Whole period (809 days)			*Equinox seasons (358 days)*		
0-2	41.53	25.59	1.61	48.32	31.01	1.40
2-4	35.97	10.51	1.24	39.66	13.13	1.12
4-6	9.02	2.22	0.49	10.89	3.07	0.56
6-8	1.48	1.73	0.37	2.23	2.51	0.56
8-10	0.25	1.85	0.62	0.28	2.51	0.56
10-12	0.12	2.72	0.87	0.28	3.35	1.68
12-14	0.00	4.45	1.36	0.00	4.75	1.96
14-16	0.74	6.67	2.10	0.56	6.98	3.07
16-18	3.09	7.29	1.98	3.35	7.54	2.51
18-20	5.32	6.92	1.61	4.75	6.70	1.68
20-22	11.99	7.91	1.36	11.73	10.34	1.68
22-24	21.14	14.71	0.87	22.07	16.48	1.68
	Summer seasons (197 days)			*Winter seasons (254 days)*		
0-2	56.85	22.34	2.03	22.83	22.05	1.57
2-4	59.90	7.61	0.51	14.96	9.45	1.97
4-6	19.80	2.03	1.02	1.18	1.18	0.00
6-8	3.05	2.03	0.51	0.00	0.39	0.00
8-10	0.51	3.05	1.52	0.00	0.00	0.00
10-12	0.00	3.55	0.51	0.00	1.18	0.00
12-14	0.00	2.54	0.51	0.00	5.51	1.18
14-16	1.52	2.54	1.52	0.39	9.45	1.18
16-18	4.57	2.03	1.02	1.57	11.02	1.97
18-20	7.11	3.55	0.51	5.12	10.24	2.36
20-22	16.75	6.60	1.02	9.45	5.91	1.18
22-24	29.44	13.20	1.02	14.17	13.78	0.39